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ANIMAL AND PLANT RESOURCES OF ALASKA

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Introduction

The wildlife of Alaska constitutes the greatest natural resource of the Territory. The extensive coastal waters support a rich sea life and an important fishing industry; the many inland rivers, ponds, and lakes support an important aquatic fur-animal, bird, and fish population; and the vast land area, offering a wide diversity of habitat, is the home of a rich flora and fauna, on nearly virgin territory.

Because of its climate and terrain, Alaska has many kinds of wildlife that are outstanding, as giant brown bears, polar bears, white mountain sheep, caribou in huge herds, large moose, a variety of fur animals (including fur seals and sea otters), waterfowl, and a luxuriant sea life that includes forms ranging all the way from diminutive shrimps to enormous whales. Because the land is thinly settled by people, about 1 person to every 10 square miles, the wildlife is still vigorous and, with few exceptions, not generally depleted. It is menaced, however, by the possibility of increased settlement and by the destruction of cover by fires.

Geological evidence shows that prior to the Ice Age Alaska may have had a more extensive land area than now and may have joined the Asiatic mainland from which it is now separated by Bering Strait. Evidence in the rock strata suggests a former, more temperate climate and an abundant prehistoric fauna and flora characteristic of preglacial times. Fossils collected and identified by the United States Geological Survey along the Yukon River, southern and southeastern Alaska, and elsewhere <sup>1/</sup> show a former growth of redwood (Sequoia), oak (Quercus), ginkgo (Ginkgo), hickory (Hicoria), walnut (Juglans), magnolia (Magnolia), elm (Ulmus), plane tree or sycamore (Platanus), grape (Vitis), witch-hazel (Hamamelis), hawthorn (Crataegus), plum (Prunus), greenbrier (Smilax), pine (Pinus), buckthorn (Rhamnus), acacia (Acacia), ash (Fraxinus), holly (Ilex), fig (Ficus), beech (Fagus), gum (Liquidambar), cypress (Taxodium), and hazel (Corylus). Contemporary forms of which representatives remain today included the dogwood (Cornus), highbush cranberry (Viburnum), birch (Betula), cottonwood (Populus), maple (Acer), willow (Salix), sweetgale (Myrica), rose (Rosa), alder (Alnus), ferns, and horsetails (Equisetum).

In crumbling banks at several points along the coasts of Bering Sea and the Arctic Ocean and along the Yukon River, and in excavations for mining, particularly in the Fairbanks area, bones of prehistoric animals are being uncovered. These show that mastodons, mammoths, water buffaloes, three-toed horses, camels, and such close relatives of existing animals as musk oxen, moose, caribou, wolves, and bears formerly occupied this region in abundance. The smaller animals and the birds, being more subject to skeletal destruction and therefore less conspicuous, have left little record of their former presence.

#### Alaska as a Home for Wildlife

The climate of Alaska today is varied, in the interior and toward the north and west being semiarid to arid, with extremes in temperature; and south of the Alaska Range temperate, with heavy rainfall in the southeastern part. Because of its extensive area and its varied climatic conditions, physical features, and vegetative cover, Alaska presents an environment suitable for wildlife in great variety and abundance.

Alaska has an area of 586,400 square miles (about one-fifth that of continental United States) and a coast line of approximately 26,000 miles. It is an area of mountains and plateaus, numerous islands, large river valleys, extensive lowlands, swamps and peat bogs, and many small ponds and lakes. The Alaska Range forms the backbone of southern Alaska and constitutes a climatic barrier between the southern part and the central interior. At its highest point is Mount McKinley, with an elevation of 20,300 feet above sea level. The Brooks Range to the north divides

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<sup>1/</sup> Hollick, Charles Arthur, and Martin, George Curtis. The Upper Cretaceous floras of Alaska with a description of the plant-bearing beds. Prof. Paper No. 159. U. S. Geol. Survey, Washington, D. C. 1930.

Hollick, Charles Arthur. The Tertiary flora of Alaska. Prof. Paper No. 182. U. S. Geol. Survey, Washington, D. C. 1936.

the Arctic slope from the central interior basin, which is formed and traversed throughout its length by the Yukon River drainage. This huge system is supplemented by that of the Kuskokwim River, the Nushagak, the Noatak, and the Kobuk. The Alaska Peninsula and the Aleutian Islands chain, which extends westward for a distance of about 1,200 miles beyond the end of the peninsula, divide Bering Sea from the Pacific Ocean. This is a region of volcanic peaks, a number of them active.

Excluding southeastern Alaska, the Prince William Sound region, and Afognak Island, which are heavily forested, the main area of Alaska is chiefly open woodland, tundra, and grassland. The coastal forests comprise dense stands of spruce, hemlock, and cedar with an undercover of mosses and shrubs. Small open patches of swamp, called muskeg, are interspersed throughout, including mainly a vegetation of sedges, shrubs, lichens, and mosses. Of the remainder of the Territory, approximately 50 percent is to some extent wooded with spruce, larch, birch, cottonwood, and aspen with an undercover of tall grasses, shrubs, forbs (flowering herbs), mosses, and lichens. Open areas consist of tundra cover, grassland, and alpine meadows. The main tundra area borders the Bering Sea and Arctic coast in a broad belt about 100 to 150 miles wide. The tundra is often semiswampy, generally hummocky, and covered with a dense vegetative mat of sedges, lichens, low or prostrate shrubs, mosses, forbs, and grasses. The interior tundra is less wet and has a greater percentage of grasses, lichens, and taller shrubs in its composition. The alpine meadows, occurring above timber line, are less densely covered with vegetation, are often rocky, and contain a greater variety of forbs, grasses, and mat-forming shrubs. The main grassland occupying the Alaska Peninsula and Aleutian Islands comprises a luxuriant cover of grasses, sedges, and forbs, with a considerable admixture of tall shrubs, as willows and alders.

The numerous islands, islets, rocks, and cliffs along the Alaska coast, and especially the Aleutian Islands, furnish an extensive habitat for many nesting sea birds. The numerous swamps, lakes, and ponds throughout the Territory and the vast tundra area form an important nesting ground for waterfowl. The large water area, the many favorable streams for spawning, and the extensive coast line supply the conditions needed for a rich aquatic life. The luxuriant cover of vegetation and wide range in ground and climatic conditions provide shelter and food for a large and varied game and fur-animal population. The variety of conditions of both water and land habitat makes a home for wildlife that is outstanding in interest and in economic value.

#### Flora of Alaska

The flora of Alaska is too abundant and rich in the number of its species to be listed here. Some of the prominent plant forms, however, that may be mentioned include the lichens, mosses, sedges, edible berry-producing shrubs, colorful forbs, willows and dwarf birches, horsetails, and, in places, tall grasses. The lichens, varying from those that are low and crustlike or leaflike to the taller, shrublike growths sometimes 10 inches in height, occur most abundantly in the interior and along the coasts

of Bering Sea and the Arctic Ocean. In places and over extensive patches of ground lichens may comprise the main cover, forming a close mat, grayish to yellowish white in color. They provide the chief winter forage for reindeer and caribou. Mosses, especially sphagnum, are found generally throughout the Territory, often underlying the other vegetation or mixed with it. Peat beds formed by an accumulation of sphagnum moss may be found in the interior to a depth of as much as 30 feet. Edible berry-producing shrubs include mountain cranberry, highbush cranberry, cloud-berry, tall salmonberry, raspberry, black currant, red currant, low and highbush blueberry, red huckleberry, mountain huckleberry, elderberry, serviceberry, Arctic bramble, and crowberry.

The numerous sedges constitute a choice forage for grazing animals. Also liked and much grazed by moose, reindeer and caribou, musk oxen, buffaloes, and mountain sheep are the abundant and widely distributed willows and the ground or dwarf birches. Many kinds of willows range from low prostrate growths on the tundra and in the alpine meadows to tall tree-like forms in southern Alaska and along the Yukon River. Three species of dwarf birch occur most abundantly in interior and western Alaska. They vary from low-growing form on the coastal tundra to taller growth in the interior.

The horsetails (Equisetum) appear everywhere, along rivers, around ponds, and in the woods, and are often troublesome weeds in field and garden. They are important as a food for wildlife, being eaten by waterfowl as well as grazing animals and in spring by bears.

Tall grasses occur most abundantly in southwestern Alaska and on Kodiak Island. Elsewhere they are commonly an invader on burned-over or cleared ground and on abandoned village sites. They occur frequently at the edge of beaches, where the giant ryegrass particularly holds sway.

Flowering plants that are most widely distributed are the arnicas, groundsels, saxifrages, elephant weeds, pinks, lupines, forget-me-nots, gentians, wild geranium, skunkcabbage, lily-of-the-valley, clintonia, rice-root, foxglove, waterhemlock, grass of Parnassus, Arctic coltsfoot, mint, poppy, iris, chrysanthemum, bedstraws, everlasting, corydalis, springbeauty, dandelion, chickweeds, starflower, wild parsnip, wallflower, Indian paintbrush, mountain bluebell, bellflowers, sweet pea, buttercups, pyrolas, stonecrops, locos, asters, goldenrod, fivefingers, larkspurs, Jacobs-ladder, knotweeds, fireweeds, daisies, twinflower, monkshood, primroses, violets, shootingstar, marshmarigold, monkeyflower, baneberry, anemones, red columbine, waterlilies, vetch, mustards, yarrow, stickseed, avens, phloxes, carchfly, and orchids. Cotton-sedges, especially on the coast tundra, often blanket the vegetative cover with their white cottony heads. Conspicuous flowering shrubs that add color to the above include the roses, Labrador-teas, spiraea, herbaceous dogwoods, bearberry or kinnikinnick, dryas, cassiope, mountainheath, mountain-ash, elderberry, shrubby cinquefoil, bog-rosemary, alpine-azalea, salmonberry, silverberry, and an occasional rhododendron.

## Fauna of Alaska

Big-game animals indigenous to Alaska include the moose, caribou, Sitka deer, mountain goat, Dall sheep, and the black, grizzly, Alaska brown, and polar bears. Introduced game animals are the elk, buffalo, and musk ox. Of these the musk ox originally was indigenous, but it was extirpated about a century ago, and has since been reintroduced, 34 animals having been captured in eastern Greenland and brought to Alaska in 1930. The herd was placed on Nunivak Island and numbered about 90 animals in 1940. Eight elk introduced in 1928 from the State of Washington and placed on Afognak Island had increased to nearly 200 in 1940. The herd of 23 buffaloes brought to Fairbanks from Montana in 1928 totaled about 200 in 1939. Reindeer introduced from Siberia over a period of years from 1891 to 1902 have increased from about 1,280 to an estimated 1,000,000 animals. The reindeer is a semidomestic animal.

The approximate number of game animals in Alaska is estimated by the Alaska Game Commission to be about one and one-third million, as follows: Moose, 60,000; caribou, 1,000,000; Sitka deer, 40,000; mountain goats, 12,500; Dall sheep, 40,000; black bears, 100,000; Alaska brown bears and grizzlies, 18,300; and polar bears, 3,000.

Land fur animals in Alaska have been estimated by the Alaska Game Commission to number about 91,500,000, as follows: Ground squirrels, 10,000,000; tree squirrels, 40,000,000; flying squirrels, 2,000,000; marmots, 2,000,000; white foxes, 60,000; blue foxes, 40,000; red foxes, 160,000; cross foxes, 25,000; silver-black foxes, 500; Arctic hares, 250,000; snowshoe hares, 30,000,000; beavers, 300,000; muskrats, 4,000,000; martens, 30,000; minks, 500,000; weasels, 2,000,000; land otters, 30,000; wolverines, 7,500; lynxes, 20,000.

Predators, which also have a fur value, are the wolf and the coyote. The number of wolves is roughly estimated to be about 7,000. The coyotes, fairly recent arrivals in Alaska, have increased greatly and have spread to all parts of the Territory except southeast. Their estimated number is about 10,000. The number of wolf and coyote pelts on which bounty was paid during the biennium April 1, 1937, to May 31, 1939, was 8,250. From April 1, 1939, to September 12, 1939, of the present biennium, bounty has been paid on 1,893 coyotes and wolves. About twice as many coyotes as wolves have been turned in.

Shrews are found in Alaska, but bats are exceedingly rare. The rodents, aside from rabbits and squirrels, include the lemming, porcupine, pika, rock-chuck, and many species of mice. The smaller rodents and rabbits furnish an important food supply for many fur animals. Like upland-game birds they seem to come and go in cycles of abundance at approximately 9-year intervals. The cause of this recurrent depletion has not yet been learned.

The upland-game birds include the rock, willow, and white-tailed ptarmigans and the sharp-tailed, sooty, spruce (fool hen), and ruffed grouse. Introduced birds are the ring-necked pheasant and the Hungarian partridge. The ring-necked pheasant is reported to be doing well in southeastern Alaska.

Predaceous birds are the goshawk, the Cooper's, red-tailed, sparrow, sharp-skinned, duck, marsh, and rough-legged hawks, and the osprey; the bald and golden eagles; the great horned, great gray, snowy, short-eared, Richardson, and saw-whet owls. Ravens, crows, and magpies occur.

Among the many song and insectivorous birds found in summer may be listed several species of sparrows and the robin, camp robber or Alaska jay, kinglets, chickadees, nuthatches, thrushes, woodpeckers, blackbirds, butcherbird or shrike, kingfisher, juncos, longspurs, snow buntings, warblers, grosbeak, crossbills, swallows, bluebirds, and hummingbirds.

Waterfowl include the whistling swan and the economically important ducks and geese that nest abundantly in Alaska and annually migrate to the States to augment the hunting supply. The ducks comprise the pintail, mallard, green-winged teal, canvasback, baldpate, old squaw, mergansers, harlequin, goldeneyes, scaups, scoters, bufflehead, and the Pacific and king eiders. The geese include the Canada, cackling, lesser snow, black brant, white-fronted, and emperor. In addition is the little brown crane.

Sea birds are the gulls, jaegers, cormorants, puffins, murrets, murrelets, auklets, shearwaters, loons, terns, grebes, fulmar, guillemots, and petrels. Shorebirds include the sandpipers, curlews, plovers, snipe, yellowlegs, and phalaropes.

Fresh-water fishes include the Dolly Varden, cutthroat, steelhead, Mackinaw or lake, rainbow, and eastern brook (introduced) trouts, and the whitefish, grayling, blackfish, and pickerel. Salt-water fishes include the silver (coho), chum (keta), pink (humpback), red (sockeye), and king salmons, and the halibut, ling-cod, tomcod, rockfish, herring, smelt, sablefish, and flounder.

Sea mammals are the right, gray, sei, blue, fin, humpback, least orqual, bowhead, and white (beluga) whales, the Dall and common porpoises, walrus, the fur, hair, bearded (oogruk), and ribbon seals, sealion, and sea otter. Other marine-animal life includes several kinds of edible clams, crabs, and shrimps.

Insects are important as a food for certain birds, and some forms are chiefly of note as pestiferous to man and animals. The abundant gnats and mosquitoes in places are extremely bothersome. The warble and nose flies of the reindeer and caribou are serious and sometimes fatal pests. The rabbit tick may transmit the disease tularemia. Some of the



other insects and related forms that occur in Alaska are the housefly, blow-fly, bluebottle fly, many biting flies, several kinds of carrion flies, the deer fly, moose fly, three horseflies, several kinds of ants, butterflies, bumblebees, hornets, wasps, dragonflies, aphids, moths, syrphid flies, lice, borers, miner beetles, a few grasshoppers, and many other flying insects, and spiders and mites.

### The Depletion of Wildlife

The abundance of fur animals and the high value of sea otter pelts particularly attracted early Russian settlement. During Russian occupation and early American possession of the Territory the take of sea otters was so great as to result in their near extermination. A bare remnant remains today along some of the islands of the Aleutian chain. The fur seal, likewise, was threatened with extermination, but the United States Government in 1911 effected an agreement with Great Britain, Russia, and Japan whereby the take of fur seals is now regulated and the crop harvested on the Pribilof Islands under Federal supervision. The Pribilof Islands, to which the fur seals annually migrate in spring for breeding, constitute their principal rookery. Surplus young bulls are killed and pelted at that time, and the pelts or the proceeds therefrom are divided among the treaty nations, except Russia.

Under the early American occupation, whaling in Alaskan waters, particularly in the Arctic, reached enormous proportions. Whale oil and whalebone were in great demand; the supply of whales became greatly depleted, and the bowhead was nearly wiped out. The influx of whalers to Bering Sea and the Arctic Ocean caused other forms of wildlife to suffer. Because of wintering whalers, occupation by other white people, and the use of high-powered rifles by the natives, the game became so depleted as to arouse concern for the food supply of the Eskimos. As a consequence, reindeer were introduced. In the depletion of wildlife that took place, one game animal, the musk ox, was entirely destroyed.

### Importance of Alaskan Wildlife

Of the wildlife resources of Alaska, fisheries and kindred pursuits have the highest monetary and employment value. The annual production is worth \$50,000,000 and a large part of the population, both native and white, are engaged in the fishing industry. The number of persons so employed during 1939 was 30,572. <sup>2/</sup> The chief commercial production of the industry is canned salmon. Other products include halibut, herring, and cod; clams, shrimp and crabs; and whales.

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<sup>2/</sup> Bower, Ward T. Alaska fishery and fur-seal industries in 1939. Adm. Rpt. 40, Appendix to Comn. Fisheries Rpt. 1940:1941. [In press.]

Trapping fur animals for their pelts and fur farming are next in importance. The value of all fur animals is estimated at approximately \$35,000,000. The annual harvest is valued at about \$2,000,000. During the calendar year 1939, 554,725 furs shipped from Alaska were valued at \$1,910,111.21. <sup>3/</sup> Probably not less than 15,000 natives and whites, women and children included, share in the proceeds received from sales of pelts, in addition to which they use large quantities of inferior grades of local furs for garments and bedding. Blue and silver fox and mink raising is an established occupation in the Territory. During the fiscal year 1939, 273 fur-farming licenses were issued by the Alaska Game Commission.

Hunting for game with gun and camera and fishing for sport are of incalculable value to the Territory. These activities attract many people from the States and other parts of the world. An approximate monetary value placed by the Alaska Game Commission on the total number of game animals in the Territory is \$51,675,000. This evaluation is based on returns in license fees, employment of guides, payment for transportation, hotel accommodations, and the like, and the estimated value of meat and hides to the local hunter for food and clothing. In addition to the trophy, meat, and hide value of game animals and fish there is also their importance from a recreational and scientific viewpoint. As an aid to exploration and settlement the game resources have been a major factor and will continue to be so if adequately maintained.

#### Related Land Uses

In production value of Alaskan resources, fisheries come first, mining second, and fur third. Other related land uses are grazing, crop farming, and lumbering. Fishing, trapping, and prospecting often go hand in hand with other pursuits, these being seasonal. The chief grazing is by reindeer on the Bering Sea and Arctic coasts, of principal importance to the Eskimos. Cattle and sheep are raised to a very limited extent on the Kodiak Island group and the Aleutian Islands. Crop farming chiefly applies to the Matanuska Valley and the Tanana Valley in the interior. Lumbering for local consumption centers at Ketchikan in southeastern Alaska and at Fairbanks in the interior. Agricultural production and lumbering as yet are largely undeveloped.

#### The Wildlife Problem

The wildlife resources in Alaska present a problem in proper use and maintenance not only as to present use and potential future importance to local settlement but also as to their interest to the United States. One objective is to avoid the mistakes made in settling the western States,

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<sup>3/</sup> Mimeographed statement issued by U. S. Department of the Interior, Bureau of Biological Survey, Alaska Game Commission, Juneau, Alaska, "Furs Shipped from Alaska During the Calendar Year 1939."

which resulted in undue destruction of game. The purpose is to maintain the wildlife that is now available in conformity with other reasonable uses of land, to improve it, and to harvest the annual crop on a sustained-yield basis.

The general problem, created by the impingement of settlement on wildlife occupation, has to do with protection of species against undue take and of cover against destruction by fires or other causes for which man is responsible. Many local questions have arisen because of irregular settlement and conflict with varying wildlife features. These problems are first in need of investigation.

The Russian and the early American occupations were largely confined to coastal Alaska. They resulted in near extermination of the sea otter, and in depletion of all game along Bering Sea and the Arctic coast. Later occupation of the interior because of discovery of gold and the increased settlement of southeastern and southern Alaska in development of the fishing industry created more and more pressure on wildlife. The take of game, fur, and fish steadily increased until it reached the point demanding regulation, which is now in effect. Continued use and the threat of further settlement require further investigation as a basis for improved regulation and management.

Contributing to the pressure on wildlife and in many instances creating important local problems, have been the construction of the Alaska Railroad and of many roads and trails; the opening up of large-scale mining operations; location of canneries; establishment of the Palmer colony in Matanuska Valley; homesteading in Tanana Valley and on Kenai Peninsula, Kodiak Island, and elsewhere; island fox ranching; and grazing development along the coast of Bering Sea and the Arctic Ocean and on the Aleutian Islands and Kodiak Island. Among these problems may be mentioned (1) the conflict between reindeer raising and caribou maintenance; (2) the raising of cattle and sheep on Kodiak Island versus occupation by brown bears; (3) the maintenance of the world-famous Kenai moose herd in the face of pressure by settlement; (4) the maintenance of wildlife and the development of livestock production in the Matanuska Valley; (5) the maintenance of Sitka deer in view of increased settlement and recurrent heavy losses during severe winters; (6) the conflict between bird nesting and production of blue foxes on the Aleutian Islands; (7) beaver production and the grazing of livestock and maintenance of fish-spawning streams; (8) the maintenance of Dall sheep and mountain goats in the face of pressure by settlement and losses from predators and disease; (9) the maintenance and improvement of waterfowl nesting areas in view of settlement demands, destruction of plant cover by fires, and losses from predaceous birds and coyotes; and (10) the protection of fur animals generally in view of increased trapping demands, fire hazards, and destruction by coyotes and wolves.

Other problems have arisen because of the introduction of exotic species. These are the care and development of (1) reindeer on the Bering Sea and Arctic coasts, (2) buffaloes in the interior, (3) elk on Afognak Island, (4) musk oxen on Nunivak Island, and (5) game birds in southern and southeastern Alaska. The diseases and parasites that afflict wildlife in Alaska require greater attention than has heretofore been given. The destruction of other forms of wildlife by predators, particularly by coyotes and wolves, bears, eagles, and gulls, also needs to be gauged for proper evaluation as a basis for regulation. Underlying all is the question of what balance should be maintained between the requirements of wildlife and man's cultural needs, giving due consideration to the economic and social aspects, both national and local.

### Present Administration of Alaskan Wildlife

The Federal Government regulates and administers all wildlife in Alaska. In 1889 the Commissioner of Fisheries instituted an investigation of the salmon fishery in Alaska by direction of Congress. Enacted in 1906, a new law to be administered by the Secretary of Commerce, gave greater protection to the salmon and other food fishes of the Territory. As a temporary expedient, in 1922, the President established by Executive order certain fishery reservations and placed them under the administrative control of the Secretary of Commerce, acting through the Commissioner of Fisheries. The first real authority for the regulation of the Alaska fisheries was not given until 1924, however, when it was conferred upon the Secretary of Commerce by the White Law. The Alaska fisheries, including aquatic mammals (the fur seals, sea lions, walruses, sea otters, and whales), are now administered by the Department of the Interior through the Fish and Wildlife Service.

Prior to the present Alaska Game Law, enacted in 1925, the regulation of game, land fur animals, and birds in the Territory was divided among several Federal agencies designated by Congress. Laws were inadequate and gradually became impracticable of enforcement. Under these conditions both game and fur animals were diminishing in numbers in many sections of the Territory. The administration of Alaskan wildlife resources was therefore placed under the Bureau of Biological Survey, then in the Department of Agriculture but now in the Department of the Interior, and with the Bureau of Fisheries, consolidated to form the Fish and Wildlife Service. The Alaska Game Law is administered through the Alaska Game Commission, composed of five members appointed by the Secretary of the Interior, one each from the four judicial divisions, and the fifth member, the chief resident representative of the Fish and Wildlife Service, who also is the executive officer of the Commission. The Fish and Wildlife Service, in close cooperation with the Commission, conducts research work in the Territory with the primary object of determining best means of developing and maintaining the wildlife resources.

A number of wildlife refuges have been established in Alaska to assure the preservation and restoration of various species of wild birds and animals. In addition, the Mount McKinley National Park, Glacier Bay National Monument, and Katmai National Monument provide wildlife sanctuary. The total area in definitely established wildlife sanctuaries in 1937 was 15,436 square miles.

The Territory, through its legislature, appropriates funds for the payment of bounty on wolves, coyotes, eagles, Dolly Varden trout, hair seals, and other predaceous forms. It also cooperates with the National Government in the operation of an experimental fur farm at Petersburg, where the pen raising of foxes and minks is being studied. This experimental fur farm is a branch station of the Office of Experiment Stations of the Department of Agriculture, conducted in cooperation with the University of Alaska.

#### Investigations of Wildlife Resources in Alaska

The solution of wildlife problems in Alaska requires research, management planning, and suitable regulation and enforcement based thereon. Results of investigations of the fisheries and fur seals are obtained in the reports of the former Bureau of Fisheries (now part of the Fish and Wildlife Service) which maintains laboratories for research at Seattle, Wash., and at Ketchikan and Little Fort Walter, Alaska. Previous investigations of the flora and fauna of Alaska have been mostly of a general character by various governmental agencies or private individuals or incidental to other surveys. These are included in the reports of the Geological Survey, Forest Service, the Harriman Alaska Expedition, National Geographic Society, Bureau of Soils, Bureau of Plant Industry, and the former Bureau of Biological Survey (Fish and Wildlife Service). Specific investigations and published reports are available on the silver and blue foxes, the caribou and reindeer, and on the brown bear of Admiralty Island. A reindeer experiment station was maintained by the Biological Survey on Bering Sea and later at College, Alaska, from 1920 to 1936. Although chiefly engaged in investigations of reindeer and caribou and forage resources, the station also studied mountain sheep, musk oxen, and buffaloes. Cooperative studies by the Biological Survey and the Alaska Game Commission have been made of the birds and foxes on the Aleutian Islands. Preliminary studies are now being made of the waterfowl nesting grounds in Alaska by the Fish and Wildlife Service and the Commission.

Present investigations of the land wildlife resources in Alaska were begun in October 1937. The aim is to develop a program of wildlife research that will give to administration the factual information needed for regulation and enforcement. By scientific study and observation of specific problems, especially of those most pressing, it is hoped to give the administration a basis for prompt action that will as far as possible avoid future conflicts and assure the perpetuation and proper use of desirable wildlife features.

Active research projects that have been initiated include (1) the Kenai moose, (2) the Kodiak Island bear versus cattle raising, (3) the Nunivak Island musk oxen, (4) the buffalo in the interior, (5) the Kodiak Island beaver as related to cattle raising and fish spawning, (6) the Dall sheep and wolves in the interior, and (7) the Matanuska Valley range and wildlife in relation to the development of colonies. Many other projects have been planned for future work. Coincident with the demands for research are the needs for additional enforcement of wildlife laws. At present only 12 agents are available to police and care for wildlife that ranges over an area equal in size to the combined Rocky Mountain States of Wyoming, Colorado, New Mexico, and Arizona.

The research program outlined for consideration contemplates the establishment of a headquarters station and laboratory that is central to the main area of the Territory. A staff scientifically trained in range and wildlife management is planned. Branch field stations are tentatively considered for southeastern Alaska, the Bristol Bay region, and the interior. From these points as well as from the main station, the most pressing local problems and representative wildlife features requiring investigation can be handled. Expansion of this program may suggest additional points of operation or temporary shifts of field headquarters to meet new developments. A flexible program is intended to deal with a widely distributed and mobile wildlife population and changing conditions of settlement. Although many individual species are distributed over a wide range, concentrations occur at favorable places. It is at such places that the more important problems are apt to arise. Some of the major features that require first attention have been mentioned. Others no doubt will develop as changes in settlement take place.